Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Cancelled).

2.   (Currently Amended) The method of claim 1$\underline{2}$, wherein:

the *a priori* probability values are represented by $P(s_k=a_i)$, where the symbols in a symbol interval are represented by s_k, and k is an index identifying a transmit antenna; and

a_i is an ith value in an alphabet set from which the symbols take their values.

3.   (Currently Amended) The method of claim 1$\underline{2}$, wherein:

the Monte Carlo samples comprise stochastic Monte Carlo samples.

4.   (Currently Amended) The method of claim 1$\underline{2}$, wherein:

the probability distribution of the symbols is represented by $p(\mathbf{s} \mid \mathbf{z})$, where $\mathbf{s}$ is a vector of transmitted signal values for different transmit antennas in a symbol interval, and $\mathbf{z}$ is a vector of received signals from the different transmit antennas after nulling.

5.   (Currently Amended) The method of claim 1$\underline{2}$, wherein determining the set of Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, comprises:

determining a trial sampling density for each ith value, a_i, in an alphabet set A from which the symbols take their values, using the *a priori* probability value $P(s_k=a_i)$ from a previous iteration, where the symbols are represented by s_k, and k is an index identifying a transmit antenna;

drawing the jth sample symbol $s_k^{(j)}$, from the alphabet set A, where j=1,2,...,m, and m is a number of the Monte Carlo samples determined for the symbol interval; and

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computing an importance weight $w_k^{(j)}$ for $s_k^{(j)}$.

6.   (Original)   The method of claim 5, further comprising:
performing resampling to obtain updated importance weights $w_k^{(j)}$.

7.   (Original)   The method of claim 5, further comprising:
initializing the importance weights $w_{-1}(j)=1$.

8.   (Currently Amended) The method of claim 12, wherein:
m is a number of the Monte Carlo samples determined for a symbol interval;
the Monte Carlo samples are represented by $\{(s_k^{(j)}, w_k^{(j)})\}$;
each *a posteriori* probability value $P(s_k=a_i \mid z)$ is obtained from

$$P(s_k=a_i \mid z)= \frac{1}{W_k} \sum_{j=1}^{m} 1(s_k^{(j)} = a_i) w_k^{(j)}, a_i \in A \text{ where}$$

z is a vector of received signals from different transmit antennas after nulling;
the symbols are represented by s_k, where k is an index identifying a transmit antenna;
importance weights for the symbols s_k are represented by w_k;
A is an alphabet set from which the symbols take their values, and a_i is an ith value in A;

$$W_k \triangleq \sum_{j=1}^{m} w_k^{(j)} \text{ ; and}$$

1 is an indicator function defined by $\quad 1(x=a) = \begin{cases} 1, & \text{if } x=a, \\ 0, & \text{if } x \neq a. \end{cases}$.

9.   (Currently Amended) The method of claim 12, further comprising:
based on the *a posteriori* probability values, calculating *a posteriori* log-likelihood ratios
of interleaved code bits.

10.   (Currently Amended) The method of claim 12, wherein:
the Monte Carlo samples comprise deterministic Monte Carlo samples.

11.   (Currently Amended) The method of claim 1$\underline{2}$, wherein determining the set of Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, comprises:

calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the Monte Carlo samples determined for the symbol interval;

computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

selecting and preserving m distinct data sequences with the highest weights.

12.   (Currently Amended) ~~The~~ $\underline{A}$ method ~~for demodulating data from~~ ~~of claim 1,~~ ~~wherein: the channel comprises~~ a multiple-input multiple-output (MIMO) channel$\underline{, comprising:}$

$\underline{\text{receiving } \textit{a priori} \text{ probability values for symbols transmitted across the MIMO channel;}}$

$\underline{\text{in accordance with the } \textit{a priori} \text{ probability values, determining a set of Monte Carlo}}$ $\underline{\text{samples of the symbols weighted with respect to a probability distribution of the symbols; and}}$

$\underline{\text{estimating } \textit{a posteriori} \text{ probability values for the symbols based on the set of Monte}}$ $\underline{\text{Carlo samples.}}$

13.   (Currently Amended) A program storage device tangibly embodying a program of instructions executable by a machine to perform a method for demodulating data from a $\underline{\text{multiple-input multiple-output (MIMO)}}$ channel, the method comprising:

receiving *a priori* probability values for symbols transmitted across the $\underline{\text{MIMO}}$ channel;

in accordance with the *a priori* probability values, determining a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols; and

estimating *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

14.   (Cancelled)

15.   (Currently Amended) The demodulator of claim [[14]]$\underline{17}$, wherein:

the Monte Carlo samples comprise stochastic Monte Carlo samples.

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16. (Currently Amended) The demodulator of claim [[14]]17, wherein:
the Monte Carlo samples comprise deterministic Monte Carlo samples.

17. (Currently Amended) ~~The~~ A demodulator ~~of claim 14, wherein:~~
~~the channel comprises~~ for demodulating data from a multiple-input multiple-output
(MIMO) channel, comprising:
means for receiving *a priori* probability values for symbols transmitted across the MIMO
channel;
means for determining, in accordance with the *a priori* probability values, a set of Monte
Carlo samples of the symbols weighted with respect to a probability distribution of the symbols;
and
means for estimating *a posteriori* probability values for the symbols based on the set of
Monte Carlo samples.

18. (Cancelled)

19. (Currently Amended) The receiver of claim [[18]]20, further comprising:
a bit log likelihood ratio computer that is responsive to the *a posteriori* probability values
for determining *a posteriori* log-likelihood ratios (LLRs) of the bit data.

20. (Currently Amended) ~~The~~ A receiver ~~of claim 18, wherein:~~
~~the channel from which the data is received is~~ for receiving data from a multiple-input
multiple-output (MIMO) channel, comprising
a soft outer channel decoder;
a soft inner demodulator; and
a symbol probability computer; wherein:
the symbol probability computer calculates *a priori* symbol probability values based on
bit data received from the soft outer channel decoder; and

the soft inner demodulator, in accordance with the *a priori* probability values, determines a set of Monte Carlo samples of the symbols weighted with respect to a probability distribution of the symbols, and estimates *a posteriori* probability values for the symbols based on the set of Monte Carlo samples.

21.   (Currently Amended) A method for demodulating data from a channel, the channel comprising a multiple-input multiple-output (MIMO) channel, the method comprising:

(a) receiving *a priori* probability values for symbols transmitted across the channel;

(b) in accordance with the *a priori* probability values, determining a set of deterministic Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, weighted with respect to a probability distribution of the symbols, by:

(b)(1) calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the deterministic Monte Carlo samples determined for the symbol interval;

(b)(2) computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

(b)(3) selecting and preserving m distinct data sequences with the highest weights; and

(c) estimating *a posteriori* probability values for the symbols based on the set of deterministic Monte Carlo samples; wherein:

(d) the probability distribution of the symbols is represented by $p(\mathbf{s} \mid \mathbf{z})$, where $\mathbf{s}$ is a vector of transmitted signal values for different transmit antennas in a symbol interval, and $\mathbf{z}$ is a vector of received signals from the different transmit antennas after nulling.

22.   (Currently Amended) A method for demodulating data from a channel, the channel comprising a multiple-input multiple-output (MIMO) channel, the method comprising:

(a) receiving *a priori* probability values for symbols transmitted across the channel;

(b) in accordance with the *a priori* probability values, determining a set of deterministic Monte Carlo samples of the symbols in a symbol interval, represented by $\{(s_k^{(j)}, w_k^{(j)})\}$, weighted with respect to a probability distribution of the symbols, by:

(b)(1) calculating an exact expression for the probability distribution by enumerating m samples for less than all transmit antennas to obtain m data sequences, where m is a number of the deterministic Monte Carlo samples determined for the symbol interval;

(b)(2) computing the importance weight $w_k^{(j)}$ for each symbol $s_k^{(j)}$, where k is an index identifying a transmit antenna; and

(b)(3) selecting and preserving m distinct data sequences with the highest weights;

(c) estimating *a posteriori* probability values for the symbols based on the set of deterministic Monte Carlo samples; wherein:

(d) wherein the probability distribution of the symbols is represented by p(**s** | **z**), where **s** is a vector of transmitted signal values for different transmit antennas in a symbol interval, and **z** is a vector of received signals from the different transmit antennas after nulling;

(e) wherein m is a number of the deterministic Monte Carlo samples determined for a symbol interval;

each *a posteriori* probability value $P(s_k=a_i | \mathbf{z})$ is obtained from

$$P(s_k=a_i | \mathbf{z}) = \frac{1}{W_k} \sum_{j=1}^{m} 1(s_k^{(j)} = a_i) w_k^{(j)}, a_i \in A \quad \text{where}$$

z is a vector of received signals from different transmit antennas after nulling;

A is an alphabet set from which the symbols take their values, and a_i is an ith value in A;

$$W_k \triangleq \sum_{j=1}^{m} w_k^{(j)} \quad ; \text{and}$$

1 is an indicator function defined by $\quad 1(x = a) = \begin{cases} 1, & \text{if } x = a, \\ 0, & \text{if } x \neq a. \end{cases}$.

and

(f) calculating, based on the *a posteriori* probability values, *a posteriori* log-likelihood ratios of interleaved code bits.